

**Remarks:**

Reconsideration of this application in view of the following remarks is respectfully requested. Claims 1-8 and 10-13 are currently pending. Claims 1-8 and 10-13 presently stand rejected under 35 U.S.C. § 103(a) as purportedly being obvious for the reasons previously made of record. Applicant respectfully disagrees and traverses all of the Examiner's grounds of rejection.

At base, the Examiner has taken the position that the ABS material taught by U.S. Patent No. 5,137,071 to Ashton et al. is an "elastic" material (and, therefore, the claimed invention is obvious – meaning that the Examiner equates the "elastic bladder" recited in the presently claimed invention to be the same as the combined ABS layer/silicone rubber layer taught by Ashton et al.). In this regard, the Examiner does not dispute the fact that the ABS layer taught by Ashton et al. may be considered "hard"<sup>1</sup>; however, the Examiner notes "that whether ABS is considered 'hard' does not refute the fact that ABS is elastic." (Office Action at page 6, first full paragraph). Applicant respectfully disagrees with the Examiner's conclusion. Contrary to the Examiner's recalcitrant understanding of polymer chemistry, the fact that the ABS layer taught by Ashton et al. is considered "hard" conclusively demonstrates that it may not also be considered "elastic." In other words, the ABS layer taught by Ashton et al. may be either a hard plastic or an elastomeric plastic, but not both.

In considering Applicant's previous arguments regarding patentability, the Examiner does, however, correctly point out the butadiene component of Acrylonitrile-Butadiene-Styrene (ABS) imparts elasticity to the ABS polymer chain. The Examiner's further syllogism regarding car dashboards made of ABS (and their ability to be compressed without cracking and subsequently returned to their original shape) is largely misplaced, however, because this analogy fails to consider the mechanical effects imparted by the "closed cells" that make up "foamed" ABS dashboard. Moreover, and contrary to the views of those having knowledge of polymer chemistry, the Examiner in support of his erroneous position points to two supporting references, Reddy et al. and

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<sup>1</sup> Indeed, the central idea behind the Ashton et al. reference is to provide a hard, but heat-softenable, mandrel (referred to as the ABS layer) upon which various composite materials and resins can be initially assembled; thereafter, an inflatable "elastic" layer of silicone rubber (referred to as the envelope bag) is pressurized so as to push against the rigid ABS layer and compact the "layered-up" composite materials and resins against a hard outer mold surface.

Ishibashi et al., for purposes of demonstrating “the fact that ABS is an elastic material” (Office Action at page 6, second paragraph). A careful review of each of these additional references, however, demonstrates that neither fully supports the Examiner’s position.

Indeed, U.S. Patent No. 7,007,755 to Reddy et al. (which is not a proper prior art reference under 35 U.S.C. §102/103) is directed to elastomeric admixtures that comprise a cementitious material, an ABS polymer, and water; and with respect to the ABS polymer component this reference clearly teaches:

ABS used with the present embodiments is often produced as a composite material. In the production of such a composite material, a preformed elastomer such as polybutadiene or styrene butadiene rubber is used as a substrate, and styrene and acrylonitrile monomers are grafted onto the substrate by polymerization. In addition, styrene and acrylonitrile that fail to graft to the substrate copolymerize to form a matrix, with the grafted substrate dispersed in the matrix. Higher levels of butadiene in the final product increases the elastomeric properties of the composite material. In contrast, higher levels of styrene and acrylonitrile in the final product decrease the elastomeric properties of the composite material. As can be appreciated, the character of the ABS varies by the composition of the composite material, and thus affects the mechanical properties of the cementing composition.

Specification at col. 2, lines 27-44 (*emphasis added*).

As best as Applicant can tell, this reference merely supports the well established principal that more butadiene increases elastomeric properties, whereas less butadiene decreases elastomeric properties. This reference nowhere teaches or suggests that ABS polymer is considered to be an elastomeric material. U.S. Patent No. 6,110,406 to Ishibashi et al., on the other hand, merely suggests that specialty core/shell graft ABS polymers exists and that these types of specialty polymers may be considered elastomeric.

For purposes of clarity and enhanced understanding of the fundamental issues and teachings of the prior art, Applicant believes that a short overview of ABS polymer chemistry is in order. To this end, Applicant respectfully submits that ABS is a terpolymer whose sales have grown over the years (first introduced commercially in the 1940s) to become the largest engineering thermoplastic in the world. The versatility of ABS is derived from its three monomeric building blocks - acrylonitrile, butadiene, and styrene. Each component imparts a different set of useful properties to the final polymer. Acrylonitrile primarily offers chemical resistance and heat stability; butadiene delivers

toughness and impact strength; and the styrene component provides ABS with rigidity and processability. ABS materials are normally prepared with 50% or more styrene monomer in one of three manufacturing processes – emulsion, continuous mass (bulk), or suspension. Often, more than one of these processes is combined, optimizing the final polymer. ABS resin is a two-phase system having a styrene-acrylonitrile copolymer (SAN) as a continuous phase with a dispersed elastomeric phase of butadiene-derived rubber. In actuality, small amounts of styrene and acrylonitrile are copolymerized (grafted) onto the butadiene rubber component to compatibilize the otherwise rigid SAN and rubber phases. Thus, ABS has been viewed as one of the first commercially successful polymer alloys.

By varying the ratio of the three A-B-S monomers, the molecular weight of the overall polymer, and morphology of the rubber phase provides an unlimited number or product options within the ABS family. For example, the particle size of the rubber phase may be varied from less than 0.1 micron to several microns. Moreover, the average particle size and the particle size distribution within this rubber phase have dramatic effects on the overall balance of properties including strength, toughness, and rigidity/elasticity. Finally, and although ABS may be manufactured to be elastomeric in certain instances, the overwhelming majority of ABS sold in commerce is considered to be rigid. For example, Wikipedia describes ABS in the following way:

**Acrylonitrile butadiene styrene, or ABS,** (chemical formula  $(C_8H_8 \cdot C_4H_6 \cdot C_3H_3N)_n$ ) is a common thermoplastic used to make light, **rigid**, molded products such as piping, musical instruments (most notably recorders and plastic clarinets), golf club heads (used for its good shock absorbance), automotive body parts, wheel covers, enclosures, protective head gear, vballs [reusable paintballs], and toys including LEGO bricks. In plumbing, ABS pipes are the black pipes (PVC pipes are white) and also in Plastic Pressure Pipe Systems. ABS plastic ground down to an average diameter of less than 1 micrometer is used as the colorant in some tattoo inks.

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It is a copolymer made by polymerizing styrene and acrylonitrile in the presence of polybutadiene. The proportions can vary from 15 to 35% acrylonitrile, 5 to 30% butadiene and 40 to 60% styrene. The result is a long chain of polybutadiene criss-crossed with shorter chains of poly(styrene-co-acrylonitrile). The nitrile groups from neighboring

chains, being polar, attract each other and bind the chains together, making ABS stronger than pure polystyrene. The styrene gives the plastic a shiny, impervious surface. The butadiene, a rubbery substance, provides resilience even at low temperatures. ABS can be used between -25 and 60°C. The properties are created by rubber toughening, where fine particles of elastomer are distributed throughout the rigid matrix.

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ABS is derived from acrylonitrile, butadiene, and styrene. Acrylonitrile is a synthetic monomer produced from propylene and ammonia; butadiene is a petroleum hydrocarbon obtained from butane; and styrene monomers, derived from coal, are commercially obtained from benzene and ethylene from coal. The advantage of ABS is that this material combines the strength and rigidity of the acrylonitrile and styrene polymers with the toughness of the polybutadiene rubber. The most important mechanical properties of ABS are resistance and toughness. A variety of modifications can be made to improve impact resistance, toughness, and heat resistance. The impact resistance can be amplified by increasing the proportions of polybutadiene in relation to styrene and acrylonitrile although this causes changes in other properties. Impact resistance does not fall off rapidly at lower temperatures. Stability under load is excellent with limited loads.

[http://en.wikipedia.org/wiki/Acrylonitrile\\_butadiene\\_styrene](http://en.wikipedia.org/wiki/Acrylonitrile_butadiene_styrene)

In view of this background (especially with respect to the unlimited number of product options within the ABS family) and express teachings of Ashton et al.<sup>2</sup>,

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<sup>2</sup> In this regard, Ashton et al. states the following:

It can therefore be seen that it is desired to have the foundation of a hard surface upon which to build a composite structure. The interior surface of the uncured portions of a composite structure needs to be placed against a hard structure, so as to eliminate distortion or sagging in the structure, prior to the curing process.

Ashton et al. at col. 2, lines 9-14 (*emphasis added*).

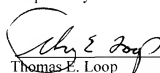
The uncured portions of the composite structure, such as the inserts and/or filament windings requires to form the structure, are therefore initially assembled on the hard surface of the ABS layer. Prior to the start of the cure of the composite structure pressure is applied to the back surface of the layer and heat is applied to the ABS layer to soften the layer, the pressure is applied to the back surface of the layer and heat is applied to the ABS layer to soften the layer, the pressure forcing the heat-softened layer and the assembled uncured portions of the composite structure outwardly into contact with the exterior mold surface.

Shrinkage of the composite structure due to the de-bulking process during the cure cycles is therefore entirely compensated for by the softening of the ABS layer and its outward movement towards the exterior mold surface.

Applicant fails to understand how the Examiner can rationally take the position that the admittedly hard ABS layer (in combination with a silicone rubber elastic layer/envelope bag) of Ashton et al. defines an elastic bladder as recited in the presently claimed invention. As is appreciated by those skilled in the art, ABS polymer is generally considered to be a hard, rigid plastic, and not an elastomeric plastic.<sup>3</sup> Accordingly, Applicant respectfully requests that the Examiner withdraw all of his obviousness rejections.

In view of the above remarks allowance of claims 1-8 and 10-13 is earnestly solicited. A good faith effort has been made to place this application in condition for allowance. If any further matter requires attention prior to allowance, the Examiner is respectfully requested to contact the undersigned attorney at (206) 568-3100 to resolve the same.

Respectfully submitted,



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The ABS layer therefore provides a hard surface when needed during the assembly of the uncured portions of the composite structure, so as to allow the portions of the structure to be precisely positioned prior to the cure.

Ashton et al. at col. 3, lines 9-29 (*emphasis added*).

<sup>3</sup> Indeed, and to the extent that the Examiner maintains his position, the inventor of the present invention has expressed his desire to travel to the U.S. Patent Office with several samples of readily available commercial grade cured ABS polymer for purposes of having a "face-to-face" meeting with the Examiner (thereby allowing the Examiner to further rationalize his position in view of demonstrative evidence).